

## CLAIMS

1. A film having a multilayer heterostructure, comprising at least one organic layer formed by self-assembly, said organic layer containing from 0.001  
5 to 100 mM of a sensitizing dye.
2. The film according to claim 1, wherein said sensitizing dye exhibits light absorption in a visible light range.
- 10 3. The film according to claim 1 or 2, wherein said sensitizing dye is a copper phthalocyanine-based compound.
4. The film according to any of claims 1 to 3, wherein said organic layer contains an aromatic compound.
- 15 5. The film according to any of claims 1 to 4, further comprising at least one inorganic layer formed by self-assembly.
- 20 6. A film having a multilayer heterostructure, comprising at least one organic layer and at least one inorganic layer each formed by self-assembly, wherein said organic layer contains an aromatic compound.
7. The film according to any of claims 1 to 6, wherein said organic layer is formed by an alternate adsorption method.
- 25 8. The film according to any of claims 5 to 7, wherein said inorganic layer is formed by a sol-gel method.
9. The film according to any of claims 5 to 8, wherein said organic and  
30 inorganic layers are alternately laminated on each other.
10. The film according to any of claims 4 to 9, wherein said aromatic

compound is a high-molecular compound having an aromatic ring.

11. The film according to any of claims 1 to 10, wherein said organic layer is produced by alternate adsorption of a high-molecular compound having an aromatic ring and a high-molecular compound having a carboxyl group.

12. The film according to any of claims 5 to 11, wherein said inorganic layer contains a titanium compound.

13. A process for producing a film having a multilayer heterostructure, comprising the step of laminating an organic layer containing an aromatic compound and a sensitizing dye on a substrate by self-assembly.

14. The process according to claim 13, wherein said sensitizing dye exhibits light absorption in a visible light range.

15. The process according to claim 13 or 14, wherein said sensitizing dye is a copper phthalocyanine-based compound.

16. The process according to any of claims 13 to 15, further comprising the step of laminating an inorganic layer on the substrate by self-assembly in addition to said organic layer.

17. A process for producing a film having a multilayer heterostructure, comprising the step of respectively laminating an organic layer containing an aromatic compound and an inorganic layer on a substrate by self-assembly.

18. The process according to any of claims 13 to 17, wherein said organic layer is laminated by an alternate adsorption method.

19. The process according to any of claims 16 to 18, wherein said inorganic layer is laminated by a sol-gel method.

20. The process according to any of claims 16 to 19, wherein said organic and inorganic layers are alternately laminated on each other.

5        21. The process according to any of claims 13 to 20, wherein said organic layer is laminated by alternate adsorption of a high-molecular compound having an aromatic ring and a high-molecular compound having a carboxyl group.

10        22. The process according to claim 21, further comprising the steps of dipping the substrate in an aqueous solution containing the high-molecular compound having an aromatic ring; dipping the substrate in an aqueous solution containing the high-molecular compound having a carboxyl group; and  
15        rinsing the substrate in a rinsing bath between the dipping steps.

23. The process according to claim 22, wherein at least one of said aqueous solution containing the high-molecular compound having an aromatic ring and said aqueous solution containing the high-molecular compound  
20        having a carboxyl group, contains a sensitizing dye.

24. The process according to any of claim 19 to 23, wherein said inorganic layer is laminated by a sol-gel method using a solution containing titanium alkoxide.

25        25. The process according to claim 24, further comprising the steps of dipping the substrate in the solution containing titanium alkoxide; hydrolyzing the titanium alkoxide adsorbed onto the substrate; and rinsing the substrate in a rinsing bath between the dipping and  
30        hydrolyzing steps.

26. An optical device using the film having a multilayer heterostructure

as claimed in any of claims 1 to 12.

27. An optical device using the film having a multilayer heterostructure which is produced by the process as claimed in any of claims 13 to 25.

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